REMARKS

Reconsideration of the issues in the above referenced Office Action is respectfully solicited.

Claim 1 has been amended to include the features of cancelled Claim 16 dependent therefrom. Thus, no new issues have been presented. Entry of the amendment and consideration thereof is respectfully requested.

The rejection of Claims 1-20 under 35 USC §103 as being unpatentable over U.S. Patent No. 5 319 671 to Hopf in view of the publication to Hopf (the Hopf publication) has been considered.

The Hopf patent and the Hopf publication describe the same type of monitoring device. The Hopf patent discloses a prewarning device for induction melting furnaces having an open circuit type arrangement.

Figure 2 of the Hopf patent shows an intermediate layer 3 between a ceramic coating composition 4 and a ceramic furnace lining 2. The intermediate layer 3 can comprise a mat 8 having ceramic foils 9, 10. The foils 9, 10 support groups of electrodes 12, 13. As shown in Figure 4 of the Hopf patent, the electrodes 12, 13 are part of electrode networks 7, 8 each separately connected to an evaluation unit 16. Figure 3 of the Hopf patent shows the arrangement of the first group of electrodes 12 with respect to the second group of electrodes 13.

Column 4, lines 7-12 of the Hopf patent discloses measuring the resistance of the ceramic foils 9, 10 via a small current that passes between the electrodes 12, 13. The resistance between the electrode networks 7, 8 of the Hopf patent is dependent upon the temperature of the foils 9, 10 which depends on the temperature of the adjacent ceramic furnace lining 2. Therefore, changes in the temperature of the furnace lining 2 are measured by changes in the temperature and thus the resistance of the foils 9, 10.

In the Hopf references, it is difficult to differentiate a high resistance value for a furnace lining from cable

breakage or connection loss. For example, the Hopf publication discloses a resistance value of 74,000 KΩ for a furnace lining of 100% thickness. Due to the large resistance value, an open circuit failure when the monitoring system does not function properly may not be sensed.

The Office Action appears to rely on page 2, paragraph [0005] of Applicants' specification, which references the Hopf publication, for the use of an ohmic resistor between a pair of electrodes. Paragraph [0005], lines 4-9 and lines 12-14 of Applicants' specification discloses the prior art Hopf system measuring an electrical resistance of a refractory material, such as a ceramic. Therefore, as discussed above, the Hopf publication and Hopf patent are both directed to measuring the resistance of a refractory material, such as a ceramic foil, which is changed by temperature fluctuations of a furnace lining, for the purpose of determining residual wall thickness to indicate localized wear of the furnace lining.

Applicants' invention provides an ohmic resistor R for the monitoring device, which is separate from and not affected by the temperature of a furnace wall. The monitoring device disclosed in the Hopf patent and the Hopf publication does not have such a resistor, but rather only provides electrodes to determine a resistance dependent on the furnace wall temperature.

Applicants' Claim 1 now recites that the "ohmic resistor R is not subjected to the furnace temperature". Applicants' resistor R clearly differs from the temperature sensing foils of the Hopf references, which are subject to and sense the temperature of the furnace lining.

If the foils 9, 10 of the Hopf references are not subjected to the furnace temperature, the monitoring device does not provide a monitoring function. Therefore, any modification to avoid the sensing of furnace temperature by the foils 9, 10 of the Hopf references results in an inoperative monitoring device.

Applicants' Claim 1 also recites the monitoring device including "a closed circuit of several electrically conductive sections", that "a first conductor section is series connected to an ohmic resistor R and a second conductor section" and that "the first conductor section is arranged directly adjacent, however, electrically isolatingly spaced from and with respect to the second conductor section".

This combination of features is not present in the applied prior art. The Hopf references, as discussed above, utilize the ceramic foil of the melting furnace to provide a temperature dependent variable resistance.

For the above reasons allowance of Claim 1, and Claims 2-15 and 17 dependent therefrom, is respectfully requested.

Applicants' Claim 6 further recites that the measuring/displaying device indicates "breakdown due to a conductor break". As best understood, the Hopf references provide a measurement of the temperature affected resistance of the lining wall. Such resistance for a thick lining wall would be very high (74,000 KΩ in the Hopf publication) and thus it is unlikely the system disclosed in the Hopf references would be able to detect a conductor break. The importance of this feature is discussed in paragraph [0013] of Applicants' specification.

Claims 15 further recites that "the ohmic resistor R has a resistance value that is clearly smaller than the resistance value of the refractory liner". This feature is disclosed in paragraph [0024] of Applicants' specification. The Hopf references do not have a resistor with a clearly smaller resistance value than the furnace lining.

For the above reasons, Claims 6 and 15 further distinguish the applied prior art.

Claims 18-20 are also allowable. Independent Claim 18 recites a monitoring device including "an ohmic resistor connecting the first conductor section and the second conductor section to form a closed series circuit, which ensures that the first and second adjacent conductor sections

are electrically isolated from each other except for the current path of the ohmic resistor". The Hopf references provide a small current flow between the conductor sections through the ceramic foils. The current flow value corresponds to the temperature of the furnace lining. Thus there is no ohmic resistor providing a current path while the conductor sections are otherwise electrically isolated.

Claim 19 recites that "the ohmic resistor is not directly subjected to the furnace temperature". As discussed above, this feature is not present in the Hopf references.

Dependent Claim 20 recites that "the ohmic resistor has a resistance value that is clearly smaller than the resistance value of the refractory liner". The Hopf references rely on ceramic foils that have similar properties as the refractory liner to act as a resistor. Thus the Hopf references do not disclose an ohmic resistor having a smaller resistance. Therefore, Claim 20 clearly distinguishes the applied prior art.

For the above reasons, reconsideration and allowance of Claims 18-20 is respectfully requested.

Further and favorable reconsideration is respectfully solicited.

Respectfully submitted,

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